

<p>  
<thead>(Collaborative Learning-Work<footnote>(\*\The views expressed in  
this presentation are those of  
the presenter and are not those of Digital Equipment  
Corporation.))

<p>  
<thead>(PTC Conference)  
<thead>(Honolulu, Hawaii)  
<p>  
<center\_line>(Charles A. Findley, Ph.D.)  
<p>

<thead>(Abstract)  
Many of us have already accepted the concept that lifelong learning is  
a regular job responsibility. I would like to propose the idea that  
for many learning is the "work." As we engage, for example, in  
creating  
solutions to novel problems, designing new software packages, or  
telling  
someone about a new trend discovered from marketing data, we are  
essentially engaging in learning and more and more  
frequently we are learning-working in collaboration with others.  
This form of work requires new job definitions and tools for  
support.

<p>  
In this presentation, I first develop the concept of learning-work.  
In terms of a basic communication model,  
I explain how, through collaborative team effort, individuals pool  
their individual knowledge, learn from each other, and express that  
learning in the form of a product such as a system design, market  
research strategy, software code or any other product. In essence,  
the job of many professionals is learning and communication of what  
they have learned to others. This is a new conceptualization of work  
and learning.

<p>  
Collaborative learning-work involves utilization of  
induction, synthesis, and dialog  
more often than deduction, analysis, and one way information  
transmission.

<p>  
Many facets of learning-work can be augmented  
in an electronic environment. In the second part of  
the presentation, I discuss computer support tools for collaborative  
learning-work.  
Within the framework of collaboration, I discuss features  
of software that can aid the learning-worker in both the intra-  
personal  
and interpersonal processes performed as part of learning-work. I  
discuss recent software developments in order to highlight specific  
features which might be used to facilitate

collaborative learning-work. I focus both on intra-personal support tools such as personal construct display systems, hyperinformation systems, simulation creation tools, and then I focus on groupware for local and wide area networking environments.

<p>

<p>

<thead>(Introduction)

<p>

Groups at different sites are learn-working together to design new products.

<p>

<p>

There is a migration to new forms of telework.

<list>(unnumbered)

<le>group rather than individual focus

<le>induction, synthesis and dialog rather than deduction analysis and one-way transmission

<le>not co-located with peers, management, or factory

<endlist>

<p>

Learning is work and work is learning.

<p>

Increasing global competition demands new forms of work.

<p>

"In today's global competition, we see successful organizations, large or small, as more distributed and less hierarchical. Information needs to be placed in the hands of the individual, and be available simultaneously across the enterprise....By providing solutions at the user level and interconnecting systems in a multivendor environment--from workstations through departmental systems to globally distributed transaction processing networks--we help our customers become more competitive than ever before." Kenneth H. Olsen, President, Digital Equipment Corp.

<p>

<p>

<thead>(Overview of Presentation)

In this presentation, I will discuss the following:

<list>(unnumbered)

<le>Trends influencing changes in work

<le>The concept of collaborative learning-work

<le>Key features of human interaction and person-machine interaction

<endlist>

<p>

<p>

<thead>(The changing nature of work)

<p>  
<list>(unnumbered)  
<le>The processes are changing--the human value added is not in muscle power but learning ability  
<p>  
<le>The technology--telecommunications and computers--to support work is changing  
<p>  
<le>Jobs require more collaboration--as knowledge becomes more specialized, solutions require interdependent experts  
<p>  
<le>Nature and function of management is changing  
<endlist>

<thead>(Collaborative learning-work)  
<thead>(The concept)  
<p>  
<list>(unnumbered)  
<le>Definition of CLW--processes, methodologies, and environments  
<list>(simple)  
<le>Interdependent individuals  
<p>  
<le>Accountable to each other  
<p>  
<le>Shared mission  
<endlist>  
<le>Goal of CLW--creation of mutual knowledge structure  
<list>(simple)  
<le>Derived from group consensus  
<p>  
<le>Involves symbolic interaction  
<p>  
<le>Product is message,"artifact" of group knowledge  
<endlist>  
<le>Requires Purposeful Communication  
<list>(simple)  
<le>Context  
<p>  
<le>Intra-personal  
<p>  
<le>Interpersonal  
<p>  
<le>Feedback  
<endlist>  
<endlist>

<thead>(Human Interaction)  
<p>  
<list>(unnumbered)  
<le>Creating the human context  
<list>(simple)

- <le>Need for context building
- <le>Trust and trustworthy messages
- <endlist>
- <le>Intra-personal interaction
- <list>(simple)
- <le>Encouraging formulation of ideas
- <le>Encouraging representation of ideas
- <endlist>
- <le>Interpersonal interaction (Dr. Mildred Shaw):
- <list>(simple)
- <LE>Relationship of points of view
- <LE>Differing terminology for the same construct
- <LE>Extending one's own construct systems
- <LE>Sharing useful constructs with others
- <LE>Facilitating areas of disagreement or agreement
- <endlist>
- <LE>Feedback
- <list>(simple)
- <le>Shared responsibility
- <le>Feedback about group process
- <endlist>
- <endlist>

#### <thead>(Person-machine Interaction)

<p>

- <list>(unnumbered)
- <le>Context,e.g.MIT Project Athena Multi-media workstation
- <list>(simple)
- <le>Windowed workstation environment

<p>

- <le>Distributed network

<p>

- <le>Two-way audio and video communication

<p>

- <le>Multivendor open connect standards

<endlist>

- <le>Intra-personal Support software
- <list>(simple)
- <le>Personal Construct--Dr. Mildred Shaw

<p>

- <le>Hypertext,e.g.Apple Hypercard (TM)

<p>

- <le>Agenda(TM), Lotus Development Corp.

<p>

- <le>Graphic interface for drawing pictures

<endlist>

<p>

- <le>Interpersonal Support software --groupware
- <list>(simple)
- <p>
- <le>"Software that will enable people to collaborate

across barriers of space and time...Louis Richman, FORTUNE, June 1987.

<p>

<le>Meeting facilitation tools--GIBIS at MCC

<p>

<le>Hypermedia system--Intermedia at Brown University

<endlist>

<Le>Feedback

<list>(simple)

<le>Consensus, voting and rating scales, E.I.E.S.(TM) New Jersey Institute of Technology

<le>Annotation software, e.g.For Comment(TM), Broderbund Software

<endlist>

<endlist>

<thead>(Conclusion)

<p>

A collaborative learning-work environment is one promising response to the demands of global competition in the new age of connectivity. In this new age, the human value-added is in the ability to learn-work quickly and constantly in the face of rapid change.

<p>

Summary of key concepts

<page>

<thead>(REFERENCES)

<p>

1 Peters, Tom. 1987.

<emphasis>(Thriving on Chaos: A Handbook for a Management Revolution.\bold) Alfred Knopf, New York.

<p>

2 Raymond, H.A., "Management in the Third Wave," <emphasis>(The Futurist\bold),  
20,5, pp.15-17.

<p>

3 Zuboff, Shoshana. <emphasis>(In the Age of the Smart Machine: The Future of Work and Power.\bold) Basic Books, New York, 1988.

<p>

4 Bransford, John et al. " Teaching Thinking and Problem Solving"  
<emphasis>(American Psychologist.\bold) 41,10,pp.1078-1088, 1986.

<p>

5 Feenberg,  
Andrew.1986."Network Design: An operating Manual for Computer Conferencing." <emphasis>(IEEE Transactions on Professional Communications.\bold) Vol.PC 29,  
No 1, March 1986,p.4.

<p>

6 Rice, Ronald and Gail Love. 1987.  
"Electronic Emotion:Socioemotional Content in a Computer-Mediated Communication Network," <emphasis>(Communication Research\bold), February, Vol 14, No 1. pp. 85-108.

<p>

7 David Johnson and Frank

Johnson. 1987. **(Joining Together: Group Theory and Group Skills)**,  
Prentice-Hall, Englewood Cliffs, New Jersey.

8 Shaw, Mildred. 1987. "Interactive Elicitation and Exchange of Knowledge in Group Problem Solving," **(Proceedings, Seventh International Congress on Personal Construct Psychology)**,  
Memphis, Tennessee, August 14-19, 1987.

9 Kerr, Elaine, and Hiltz, Starr R.  
1982. **(Computer-Mediated Communication Systems: Status and Evaluation)**. Academic Press, New York.

10 Kerr, Elaine. 1985. "Electronic Leadership: A Guide to Moderating On-line Conferences," **(IEEE Transactions on Professional Communications)** Vol. PC 29,  
No 1, p.16.

11 Conklin, Jeff. 1987.  
"Hypertext: An Introduction and Survey." **(Computer)** September, 1987, pp. 17-41.

12 Richman, Louis. 1987.  
"Software Catches the Team Spirit," **(Fortune)**. Vol 115, 12, June 8, 1987, pp. 125, 131, 132, 136.

13 Begeman, Michael and  
Jeff Conklin. 1988. "The Right Tool for the job." **(BYTE)**,  
October, Vol 13, 10,  
pp. 255-266.

14 Shaw, Mildred. 1987. "An Interactive Knowledge-Based System for Group  
Problem-Solving," **(IEEE System, Man and Cybernetics: Special Issue on Human Computer Interaction and Cognitive Engineering)**  
(In press)

15 Chang, E. 1986. "Participant systems." **(Future Computing Systems)**. Vol 1, 3.